

REMARKS/ARGUMENTS

I. Status of the Claims

Claims 129-202 are pending. The Examiner appears to have rejoined claims 146, 147 and 155-157. Accordingly, claims 129-143 and 158-202 are withdrawn. Claims 144-157 are currently presented. Claim 154 is amended. No new claims have been added.

II. Amendments to the claims

The claim dependency for claim 154 is amended to provide an antecedent basis for the term visual observation. No new matter is added.

III. Responses to the Rejections

35 USC § 112, first paragraph, written description

The Examiner has rejected claims 144-157 under 35 USC § 112, first paragraph, for allegedly failing to comply with the written description requirement. Applicants traverse.

The Examiner states that the invention is “limited to mesogenic liquid crystals encapsulated between two substrates prepared on anisotropic gold hosting an organic self-assembled monolayer, and detection using polarized light or optical spectroscopy and transmission.” Applicants respectfully submit that this finding runs contrary to the numerous embodiments described by the specification.

The specification provides substantial description of embodiments in which only one substrate is present. For example, paragraph 131 of the published application (US/2002/0142453, referred to hereinafter) states that “[t]he devices of the invention are generally multilayered and consist of **one or more** substrates.” Paragraph 132 mentions one substrate as a component in one embodiment of the disclosed device. Paragraph 138 describes that the mesogen can interface the **ambient atmosphere** in some embodiments, a liquid in other embodiments, and a solid, for example, a second substrate in further embodiments. Paragraph 189 provides that

The mesogenic layer can be layered on top of **one SAM layer or** it can be sandwiched between two SAM layers. In those embodiments in which the

mesogenic layer is sandwiched between two SAMs, a second substrate, optionally substantially identical in composition to that bearing the SAM can be layered on top of the mesogenic layer.

Thus, the specification describes numerous embodiments in which a second substrate is not present.

The specification also provides substantial description of embodiments in which the self-assembled monolayer is not present. For example, in paragraph 135, the specification discloses that “[i]n another preferred embodiment, the device utilizes a substrate which **further** comprises an organic layer attached thereto.” Paragraph 148 describes embodiments in which

The crystals can be the **sole component** of the substrate **or** they can be coated with one or more additional substrate components. Thus, it is within the scope of the present invention to utilize crystals coated with, for example one or more metal films or a metal film and an organic polymer.

Paragraph 172 provides that “[i]n addition to the ability of a substrate to anchor a mesogenic layer, an organic layer attached to the substrate is similarly able to provide such anchoring.” The specification clearly provides that in various embodiments, a self-assembled monolayer may or may not be present.

The specification also provides substantial description of embodiments in which an organic layer such as a SAM is attached to a material other than gold. Paragraph 214 provides that “[i]n another preferred embodiment, the substrate is at least partially a **metal** film, such as a gold film, and the reactive group is tethered to the metal surface by an agent displaying avidity for that surface.” Examples of metals other than gold, such as silver, platinum, palladium, nickel and copper, are provided in paragraph 154. The specification in paragraphs 196-213 provides that in other embodiments, the substrate is made of a siliceous material such as glass, which can be functionalized with components to form an organic layer via various reactive groups. Thus, clear written description exists for attaching an optionally present organic layer, such as a SAM, to a substrate other than gold.

Finally, the specification also provides substantial description of various detection methods that are applicable to the claimed methods. Paragraph 353 describes methods in which

“light can be used to simply illuminate details of the mesogenic layer. Alternatively, the light can be passed through the mesogenic layer and the amount of light transmitted, absorbed or reflected can be measured.” Paragraphs 354-356 describe numerous other techniques. For example,

Microscopic techniques can utilize simple light microscopy, confocal microscopy, polarized light microscopy, atomic force microscopy (Hu et al., *Langmuir* 13:5114-5119 (1997)), scanning tunneling microscopy (Evoy et al., *J. Vac. Sci. Technol A* 15:1438-1441, Part 2 (1997)), and the like.

Spectroscopic techniques of use in practicing the present invention include, for example, infrared spectroscopy (Zhao et al., *Langmuir* 13:2359-2362 (1997)), raman spectroscopy (Zhu et al., *Chem. Phys. Lett.* 265:334-340 (1997)), X-ray photoelectron spectroscopy (Jiang et al., *Bioelectroch. Bioener.* 42:15-23 (1997)) and the like. Visible and ultraviolet spectroscopies are also of use in the present invention.

Other useful techniques include, for example, surface plasmon resonance (Evans et al., *J. Phys. Chem. B* 101:2143-2148 (1997)), ellipsometry (Harke et al., *Thin Solid Films* 285:412-416 (1996)), impedometric methods (Rickert et al., *Biosens. Bioelectron.* 11:757-768 (1996)), and the like.

The specification therefore provides description of various detection methods beyond the Examiner's limited characterization of the detection step.

The Examiner states that “for the type of sensors that relate to the claimed invention, each requires anisotropic gold hosting an organic self-assembled monolayer.” As Applicants have shown above, a SAM attached to gold is simply one of many possible embodiments. In support of this proposition, Applicants have submitted herewith a declaration by inventor Dr. Nicholas Abbott, which states in paragraph 5 that “anisotropic gold hosting an organic self assembled monolayer is but one example of a substrate.” The declaration also provides a list of references, which show that a wide variety of substrates are suitable for the claimed methods; these include anisotropic fluids, Langmuir-Blodgett films of amphiphiles, silanized glass, polymeric films, polymers and inorganic oxides. The references indicated by the Examiner in making the rejection is consistent with the notion that a SAM on a layer of gold is just one out of many embodiments of the invention.

The Examiner states that "each of Applicants working examples is directed to substrate surfaces that have anisotropic gold (see Examples 1-6)." Description of an actual reduction to practice, however, is just one manner of showing the possession required for complying with the written description requirement. See MPEP 2163(II)(A)(3)(a). The above discussion demonstrates that Applicants have shown possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention. MPEP 2163(I) (citing *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997)). The present claims thus fully comply with the written description requirement. Withdrawal of the rejection is therefore respectfully requested.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-442-1000.

Respectfully submitted,



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